

cardiac venous trunk or coronary sinus. This is the ordinary condition. Further subdivisions arise, depending on peculiarities of the vena cava itself, which are rare; of the azygos system, which are exceedingly numerous; and of the coronary vein and sinus, which are again uncommon. Transposition occasionally produces a further modification, in which the superior cava is found on the left side; whilst the coronary sinus, the oblique vein and the vestigial fold of the pericardium, exist on the right.

*b.* In another group there might exist a right vena cava superior and a left vena azygos, as in the Sheep; but no example of this possible variety has yet been met with in the human subject.

*c.* In the third group a right and a left superior cava coexist, as in the Elephant, constituting what is termed a double vena cava superior. Thirty examples of this condition are adduced, of which eleven only have occurred in adult and otherwise perfect hearts. One of these was met with by the author, and is specially described.

Lastly, a separate or second *class* consists of those cases in which the cross branch is wanting, and which are, accordingly, destitute of the characteristic mammalian type, and present, as in Birds, the persistent condition of four independent lateral venous trunks.

The paper is illustrated by original drawings, of the development of the veins in the Sheep and in Man, of the vestiges of the left primitive vein ordinarily found in the adult human subject, and of the fresh example of double vena cava superior in Man met with by the author.

7. "A Mathematical Theory of Magnetism." By William Thomson, M.A., F.R.S.E., Fellow of St. Peter's College, Cambridge, and Professor of Natural Philosophy in the University of Glasgow.

The theory of magnetism was first mathematically treated in a complete form by Poisson. Brief sketches of his theory, with some simplifications, have been given by Green and Murphy in their works on Electricity and Magnetism. In all these writings a hypothesis of two magnetic fluids has been adopted, and strictly adhered to throughout. No physical evidence can be adduced in support of such a hypothesis; but on the contrary, recent discoveries, especially in electro-magnetism, render it extremely improbable. Hence it is of importance that all reasoning with reference to magnetism should be conducted without assuming the existence of those hypothetical fluids.

The writer of the present paper endeavours to show that a complete mathematical theory of magnetism may be established upon the sole foundation of facts generally known, and Coulomb's special experimental researches. The positive parts of this theory agree with those of Poisson's mathematical theory, and consequently the elementary mathematical formulæ coincide with those which have been previously given by Poisson.

The paper at present laid before the Royal Society is restricted to the elements of the mathematical theory, exclusively of those parts in which the phenomena of magnetic induction are considered.

The author expresses his hope to lay before the Society a continuation, containing some original mathematical investigations on magnetic distributions, and a theory of induction, in ferromagnetic or diamagnetic substances.

8. "On the Nitroprussides, a new Class of Salts." By Dr. Lyon Playfair, F.R.S., F.C.S.

When nitric acid is made to act on yellow prusside of potassium, in the proportion of one equivalent of acid for every equivalent of potassium present in the salt, the following reactions are observed. The salt dissolves in the acid with a dark red, almost black colour, a very little nitric oxide is evolved, which soon ceases, and is followed by a copious evolution of cyanogen mixed with nitrogen. The continued action of the acid causes the liquid to cease the usual reactions of red prusside of potassium; the addition of sulphate of iron now produces a slate-coloured instead of blue precipitate. On allowing the solution to cool, abundance of nitrate of potash crystallizes out, mixed with a little prussian blue, and about 5 per cent. of the original weight of the salt, of a white granular substance, which is scarcely soluble in cold, and only very slightly so in boiling water. This white substance, on examination, proves to be the remarkable body *oxamide*, the production of which in an oxidising medium is highly singular.

The dark red supernatant liquor, being neutralized with an alkaline carbonate, and boiled, deposits a green precipitate and yields a clear ruby-red solution. This solution furnishes the new class of salts, which is the subject of this paper. It may be evaporated to crystallization, and yields the nitroprusside of the base used in the neutralization.

The characters of the nitroprussides thus obtained are very marked, and cannot be confounded with those of any known class of salts.

With soluble sulphurets, the nitroprussides produce the most magnificent purple-coloured solution, and of such intensity, that they form by far the best test for the presence of a sulphuret, and betray its presence when the usual tests for a sulphuret are insufficient to expose it.

With a protosulphate of iron, the nitroprussides produce a salmon-coloured precipitate; with salts of silver, zinc and cobalt, a precipitate of a flesh colour; and with nickel, a dirty white precipitate. With a salt of copper, the precipitate is of a light green, and with salts of lead, no precipitate is occasioned.

Nitroprussic acid is obtained by adding muriatic acid to the silver salt, and forms a dark red solution, which yields on evaporation *in vacuo*, large and well-defined crystals.

The nitroprussides of sodium, potassium, ammonium, barium and calcium, are all soluble and crystallize readily, forming fine large red crystals, which have been measured by Prof. Miller of Cambridge, and are described in the paper. The salts of barium and calcium decompose on evaporation, and can after that no longer be